

# PATENT SPECIFICATION

1,060,567



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*Inventor:* ROY RAYMOND FISK.

*Date of filing Complete Specification:* May 27, 1965.

*Application Date:* May 27, 1964.

*No.* 21968/64

*Complete Specification Published:* March 8, 1967.

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Index at Acceptance:—A3 V (11D, 12M, 13A).

Int. Cl.:—A 42 b 3/00.

## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Improvements in or relating to Helmets particularly for Aviators

WE, BAXTER WOODHOUSE AND TAYLOR LIMITED, a British Company, of Woodside, Poynton, Cheshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to helmets, especially for aviators, and has as its primary object the provision of a new or improved helmet which, whilst being capable of firmly supporting and protecting an aviator's head against buffeting which may occur during flight and particularly during high-speed flight at very low altitudes, is also light and capable of being quickly released in an emergency.

Thus, according to the invention, there is provided a helmet including a protective semi-rigid skull-cap divided at its periphery into two or more parts each extending downwardly from the crown of the skull-cap, such parts being movable relatively to one another and to the said crown, and adjusting means at or near such periphery for tightening the said parts of the skull-cap to a wearer's skull.

The skull-cap may thus be divided, downwardly of its crown, into two or more parts adjustable relatively to one another and to the crown of the cap, whereby its shape may be adjusted by said adjusting means to suit different wearers.

If desired, the skull-cap may be formed in a plurality of parts, e.g. a crown part having a plurality of sector-shaped side and/or back and front parts connected thereto. Preferably, however, and in accordance with a further feature of the invention, the skull-cap will be a one-piece construction and be formed of semi-rigid, strong but light-weight material such as a suitable reinforced synthetic plastic or resin im-

pregnated glass fibre. Preferably, it will then be of a normal, i.e. undeformed, size slightly larger than the largest size of skull which it is intended to fit, although it could of course still be used by a wearer having a skull size slightly in excess of such dimensions, in which case the skull-cap would have to be expanded for donning.

Where the skull-cap is of one-piece construction the divisions between its tightenable parts may be formed by cuts or slots extending from the periphery of the skull-cap towards the crown thereof, so that the said tightenable parts of the skull-cap are of sector-like configuration. Preferably such cuts or slots will be widened at their blind, i.e. inner, ends to facilitate deformation of the cap and reduce the stresses set up around the crown thereof as a result of such deformation.

Although the skull-cap could be divided at its periphery into only two parts by two substantially diametrically opposite cuts or slots, its ability to fit snugly to a wearer's skull will clearly be increased by the provision of a greater number of divisions. Preferably, therefore, the cap will be divided at its periphery into at least four parts by the provision of a corresponding number of cuts or slots.

The said adjusting means may if desired include separate means for adjusting the positions of each adjacent pair of subdivisions of the skull-cap relatively to one another at or near the periphery thereof. Preferably, however, such means will be adapted to tighten the skull-cap to the wearer's skull simultaneously all around its periphery and may then comprise a tension member such as a wire, cord, or strip of webbing or similar material extending around such periphery and engageable at its ends in securing means. If desired one end

[Price 4s. 6d.]

of such member may be fixedly secured to the skull-cap whilst the other is received in securing means thereon adapted to grip the member in any position of adjustment. It is, however, preferable for both ends of the member to be received in interconnected or unitary securing means on the skull-cap capable of gripping the same as then the member may be tightened about the cap, to cause the same to grip the wearer's skull, by pulling on both ends of the member simultaneously in a balanced manner. The said securing means may then comprise a pair of non-return friction buckles or snubbing devices of known form, which may either be fixed to the skull-cap or joined together by a connecting piece, e.g. a strip of webbing material or the like which thus interconnects the ends of said tension member so that it encircles the skull-cap. Preferably, and in accordance with a further feature of the invention, quick-release means may be provided for releasing said adjusting means to allow the skull-cap to be released quickly in an emergency. Such quick-release means may take many forms dependent upon that of the adjusting means. Conveniently, where a connecting piece is provided as mentioned above, the quick-release means may be provided in the latter. Such connecting piece, or the tension member forming the adjusting means if the quick-release means is incorporated in the same, may then be divided at a point in its length and provided with means, such as metal eyes, connectible by a pin the withdrawal of which will thus break the connecting piece or tension member at such point.

Preferably, and in accordance with yet another feature of the invention, further means may be provided for positively holding the skull-cap down on the wearer's head, and such further means may conveniently take the form of a chin-strap. Although such chin-strap could, if desired, be connected directly to the skull-cap at the sides thereof, we prefer to connect it to the said adjusting means so that, upon the quick-release of the latter in an emergency, the chin-strap will also be loosened sufficiently to permit its, and the skull-cap's immediate removal. Conveniently the chin-strap will be provided with length-adjusting means such as a friction buckle for adapting it to various users and it may if desired be loosely connected to the sides of the skull-cap, for example by crimped elastic strip, to prevent its being separated from the skull-cap when not in use.

If desired, the aforementioned quick-release means may also serve as an anchorage for the cord of head restraint of known form, commonly used by high-speed aviators, such cord being furnished at its forward end with a metal eye for engagement by a quick-

release pin and wound on a drum which is usually incorporated in the aviator's head-rest.

The skull-cap is preferably furnished with ventilating means, which may take the form of an inner cap formed of woven material and incorporating a large number of ventilating ducts opening, in use, at various points on the skull and connectible to a common supply of air under slightly elevated pressure.

The skull-cap of the invention is particularly intended for incorporation in a helmet incorporating a face shield e.g. a hinged vizor, for protecting the face of an aviator when ejecting at speed from his aircraft. Such a shield is preferably mounted on said skull-cap or a support secured thereto.

As such a shield, a vizor constructed and hingedly mounted substantially as described and shown in British Patent Specification No. 815,498 may be employed. Such a vizor may be mounted on a frame forming part of or secured to the skull-cap. Such a frame besides supporting the hinge mountings for the vizor at the side of the wearer's head also defines a face opening provided around its periphery with means against which the vizor in its closed position is adapted to make a gas-tight seal. Such means may also be adapted to seal against the wearer's face around the chin, cheeks, temples and forehead so that the vizor when closed completes a sealed chamber or breathing mask enclosing the wearer's mouth and nose. An oxygen supply can be provided to such mask or chamber for the wearer to breathe and indeed the helmet is capable of pressurising the wearer's lungs to a small but useful extent.

In order that the invention may be more readily understood, one embodiment of the same will now be described by way of example and with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of a helmet according to the invention, in its condition of use but with its vizor removed for the sake of clarity of illustration;

Figure 2 is a top plan view of the helmet of Fig. 1, with part of its face opening-defining frame broken away;

Figure 3 is a side elevation of the skull-cap of the helmet of Fig. 1, illustrating its condition when the quick-release means has just been operated; and

Figure 4 is an elevation of such quick-release means.

In this embodiment, the helmet of the invention is particularly intended for an aviator, and includes a skull-cap 1 of somewhat elongated hemispherical shape, i.e. shaped approximately to a form which will fit slightly loosely over a normal skull. The skull-cap is formed of a semi-rigid,

strong but light material, such as resin impregnated glass fibre or a suitable reinforced synthetic plastic, and is divided around its periphery into four sub-divisions 5 each of sector-like configuration by four slots 2 extending over about two-thirds of the distance from the periphery of the skull-cap to the central point of its crown. The slots 2 are arranged symmetrically, two 10 on each side of the skull-cap, and are somewhat enlarged and reinforced at their blind ends 3 so as to reduce the stresses set up in the cap upon deformation thereof.

Adjusting means are provided for tightening the skull-cap about a wearer's skull, in the form of a webbing strap 4 extending around a major part of the periphery of the cap and passing through loops 5, preferably of metal, mounted around the cap periphery 20 which retain such strap against displacement. At the rear of the cap the ends of the strap 4 are received in securing means constituted by a two-part connecting web 6 provided at its opposite ends with friction buckles 7 to 25 receive the opposite ends of the strap, the two parts of which connecting web are joined by a quick-release means 8. The latter comprises a pair of metal eyes 9 on a plate 10 mounted on one part of the web 6, 30 and a further pair of eyes 11 mounted on a loop 12 on the other part of the web, such eyes being inter-connected by a quick-release pin 13 passing therethrough, and the pin being joined by a strong plaited cord 14 35 to an anchorage at the centre of the dome of the skull-cap 1.

Means are provided for holding the skull-cap down on a wearer's head, comprising a chin-strap 15 formed by a webbing strip 40 connected at its ends by strips of crimped elastic 16 to the periphery of the skull-cap medially of each side thereof. The latter connection, however, only serves to prevent separation of the chin-strap and skull-cap 45 when they are not in use; the operative connection between them comprises a strong cord 17 at each end of the chin-strap, securely connected thereto somewhat inwardly of the elastic strip 16 and securely 50 joined at its other end to the strap 4 forming the adjusting means for the skull-cap at a point somewhat rearwardly of the connection between the chin-strap and the cap itself. The chin-strap 15 is divided midway of its 55 length and is provided with length-adjusting means in the form of a friction buckle 18. The chin-strap is provided with a pad 19 fitting under the wearer's chin and formed with loops 20 on its outer surface through 60 which the chin-strap passes.

The skull-cap is connected to a rigid frame 21 adapted to overlie the wearer's forehead and cheeks and to pass under his chin, which frame carries at its sides pivotal 65 mountings 22 for a face vizer of the kind

described and claimed in the aforementioned Patent Specification No. 815,498, which frame is bolted to the skull-cap at 23 by a part of the frame which passes over the dome of the cap. In an alternative arrangement such frame may be constituted by an 70 integral extension of the skull-cap.

The helmet is thus donned by placing the chin in the frame 21 and bringing the skull-cap back over the head, whereafter the 75 skull-cap adjusting means is tightened by pulling outwardly on both ends 24 of the adjusting strap 4 simultaneously so as to pull it through its friction buckles 7 and draw the four sub-divisions of the flexible 80 cap firmly in onto the wearer's skull. The chin-strap 15 is then tightened to draw the cap down on the head.

If the wearer wishes to release the helmet quickly in an emergency, a sharp pull on 85 the plaited cord 14 will withdraw the quick-release pin 13 from the metal eyes 9 and 11 on the two-part connecting strap 6 joining the ends of the adjusting strap 4, thus loosening the skull-cap and simultaneously 90 loosening the chin-strap by virtue of its connection to the adjusting strap.

The quick-release pin 13 also serves as an anchorage for a metal connecting member 25 on the forward end of a head restraint strap 95 26 usually wound on a drum in the headrest of the wearer's seat (not shown), whereby withdrawal of the pin 13 also releases the wearer from such restraint.

As mentioned above, the helmet is 100 provided with a vizer hinged at 22 at each side of the frame 21 so as to be movable between a raised or out of the way position and a lowered or operative position, an over-dead-centre device being provided to 105 draw the vizer back into sealing engagement with a rubber or leather face surround carried by said frame when in its lowered or operative position.

The skull-cap is provided with built-in 110 skull ventilating means (not shown) in the form of an inner cap made of soft woven material such as cotton and carrying a number of ventilating tubes for supplying pressurised cooling air from a common 115 supply tube to various parts of the skull covered by the inner cap.

A soft leather neck surround 27 is incorporated in the helmet and is secured around the lower edges of the frame 21 and 120 to the back edge of the skull-cap 1. The neck surround is elasticated at its lower edge to fit snugly around the wearer's neck. The skull-cap 18 is formed with a down-ward protective extension 28 of its rearmost sub- 125 division, to which the rear of the neck surround 27 is secured.

It will thus be seen that we provide a strong but light-weight helmet which may easily be adjusted to the head sizes of 130

various wearers and which may be quickly released in an emergency by a single operation. The helmet is particularly suitable for use by aviators, especially in aircraft intended to fly at high speeds at very low altitudes, in which circumstances considerable buffeting may occur and efficient protection of the aviator's head is therefore necessary.

10 WHAT WE CLAIM IS:—

1. A helmet including a protective semi-rigid skull-cap divided at its periphery into two or more parts each extending downwardly from the crown of the skull-cap, such parts being movable relatively to one another and to the said crown, and adjusting means at or near such periphery for tightening the said parts of the skull-cap to a wearer's skull.

20 2. A helmet according to claim 1, wherein said skull-cap is a one-piece construction which is divided as aforesaid by cuts or slots extending from the periphery of the skull-cap towards the crown thereof, so that the said tightenable parts of the skull-cap are of sector-like configuration.

3. A helmet according to claim 2, wherein said cuts or slots in the skull-cap are widened at their blind, i.e. inner ends, to facilitate deformation of the skull-cap and to reduce the stresses set up around the crown thereof as a result of such deformation.

4. A helmet according to claim 2 or 3, wherein the said skull-cap is divided at its periphery into at least four parts by a corresponding number of said cuts or slots.

5. A helmet according to any of the preceding claims, wherein said adjusting means is adapted to tighten the skull-cap to a wearer's skull simultaneously all around the periphery of the skull-cap.

6. A helmet according to claim 5, wherein said adjusting means comprises a tension member extending around the skull-cap at or adjacent the periphery thereof and engageable at its ends in securing means.

7. A helmet according to claim 6, wherein said securing means is capable of gripping the tension member whereby the latter may be tightened about the cap by pulling on both ends thereof simultaneously in a balanced manner.

8. A helmet according to claim 7, wherein said securing means comprises a pair of non-return friction buckles or snubbing devices individually secured to the skull-cap or joined together by a connecting piece connected to the skull-cap.

9. A helmet according to any of the preceding claims, including quick-release means adapted to release said adjusting means to allow the skull-cap to be released quickly in an emergency.

10. A helmet according to claim 9 where

dependent on claim 7, wherein said tension member is divided at a point in its length and is united at such point by said quick-releasable means.

11. A helmet according to claim 9, where dependent on claim 8, and including a connecting piece as aforesaid, wherein said connecting piece is divided at a point in its length and is united by said quick-releasable means.

12. A helmet according to claim 10 or 11, wherein said quick-release means includes a pair of apertured members connected one to each of the divided parts of said tension member or connecting piece and themselves interconnected by a pin the withdrawal of which will thus break the tension member or connecting piece at said point in its length.

13. A helmet according to claim 12, wherein said pin is connected by a tension member to the crown of the skull-cap so as to be withdrawable by a pull on such member.

14. A helmet according to any of claims 9 to 13, wherein said quick-release means is also adapted to provide one anchorage point for a head restraining tension member also anchored in an aviator's seat, whereby operation of said quick-release means will also serve to release a wearer from such head restraining means.

15. A helmet according to any of the preceding claims, including a chin-strap adapted positively to hold the skull-cap down on a wearer's head.

16. A helmet according to claim 15, where dependent on claim 9, wherein said chin-strap is secured to said adjusting means so that, upon quick release of the latter in an emergency, the chin-strap will also be loosened sufficiently to permit its and the skull-cap's immediate removal.

17. A helmet according to claim 16, wherein said chin-strap is also loosely connected to the sides of the skull-cap, e.g. by crimped elastic strips.

18. A helmet according to any of the preceding claims, wherein the said skull-cap is furnished with ventilating means.

19. A helmet according to claim 18 wherein said ventilating means comprises an inner cap formed of woven material and incorporating a number of ventilating ducts opening, in use, at various points on the skull and connectible to a common supply of pressurised air.

20. A helmet according to any of the preceding claims wherein the said skull-cap mounts a frame which is adapted pivotably to support an openable and closable vizor of the helmet and also defines a face opening provided around its periphery with means against which the vizor in its closed position is adapted to make a gas-tight seal.

21. A helmet according to any of the preceding claims, wherein the said skull-cap is formed with a downwardly extending guard at its rear to cover the back of a  
5 wearer's neck.

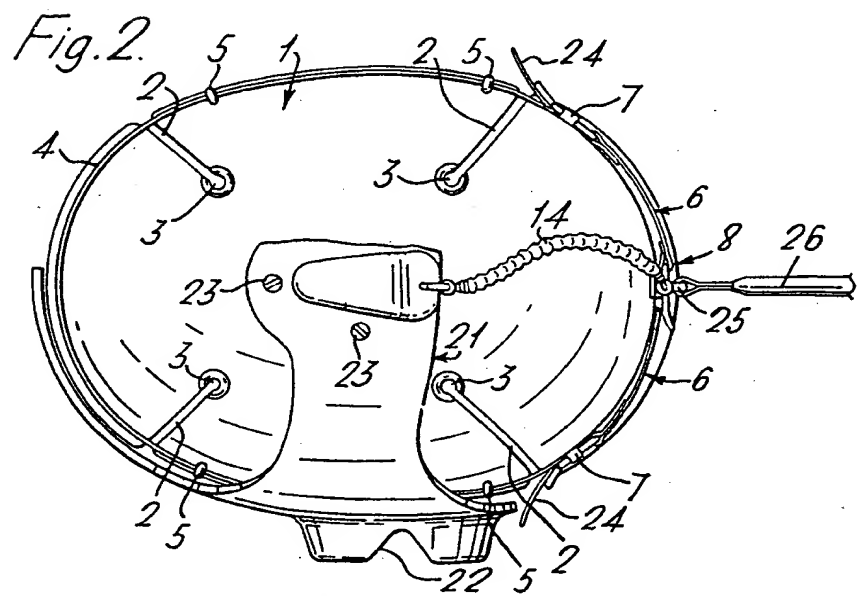
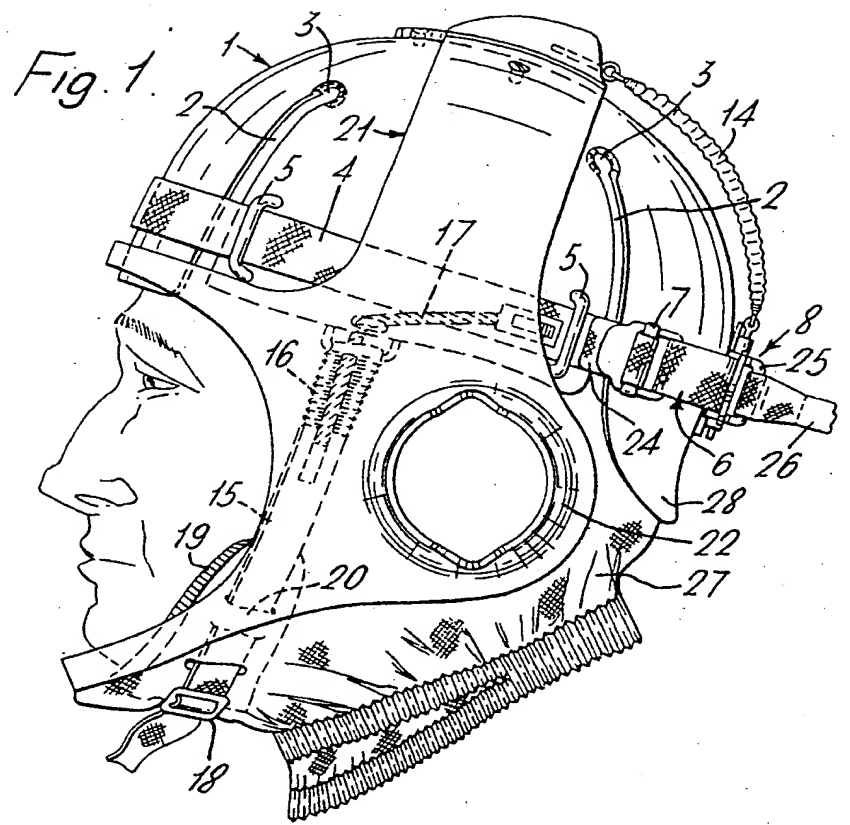
22. A helmet, including a skull-cap substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

23. A helmet substantially as herein- 10  
before described with reference to and as shown in the accompanying drawings.

For the Applicants,  
F. B. DEHN & CO.,  
Chartered Patent Agents,  
Imperial House, 15-19 Kingsway,  
London, W.C.2.

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Berwick-upon-Tweed: Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd.—1967  
Published at the Patent Office, 25 Southampton Buildings, London, W.C.2 from which copies may  
be obtained.



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2 SHEETS

COMPLETE SPECIFICATION  
This drawing is a reproduction of  
the Original on a reduced scale.  
SHEETS 1 & 2

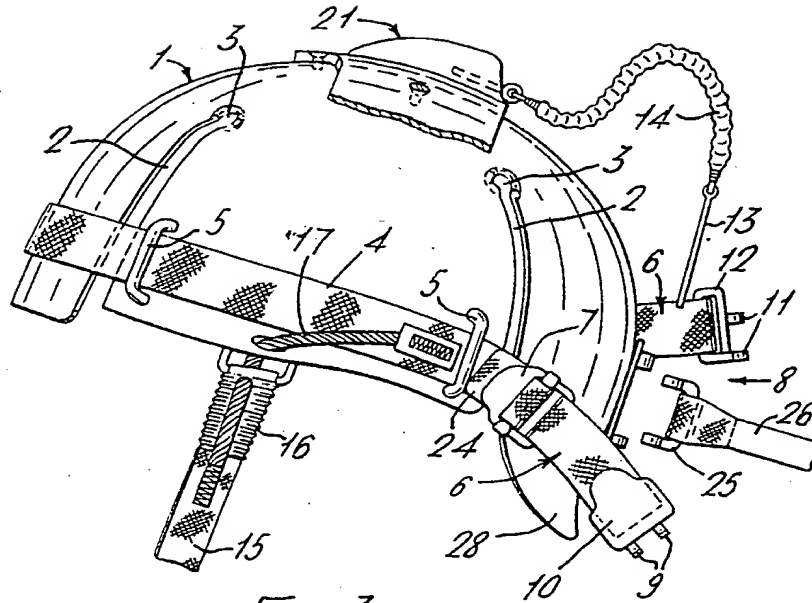
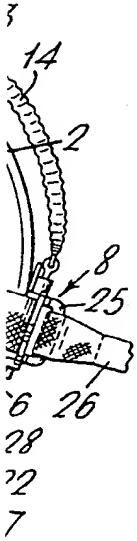


Fig. 3.

